

WHAT IS CLAIMED IS:

- 1 1. An apparatus for inducing seismic energy in a formation penetrated by a borehole,
2 comprising:
- 3 – an anchor device engaged with the borehole at a selected location; and
4 – a vibratory source at a surface location coupled to the anchor causing the anchor to
5 impart seismic energy into the formation.
- 1 2. The apparatus of claim 1 further comprising a power source to drive the vibratory source.
- 3 3. The apparatus of claim 1, wherein the power source is selected from a group consisting of
(i) a hydraulic unit; (ii) an electrically-operated device; and (iii) a pneumatic device.
- 4 4. The apparatus according to claim 1 further comprising at least one sensor to provide a
measure of a parameter of interest.
- 1 5. The apparatus of claim 4, wherein the parameter of interest is one of (i) motion of the
2 anchor; (ii) load on the anchor; (iii) load on a tubular string coupled between the anchor and the
3 vibratory source; and (iv) motion of the tubular string.
- 1 6. The apparatus of claim 1 further comprising:
2 – a first sensor proximate the anchor to measure a selected parameter of interest; and
3 – a second sensor spaced-apart from the first sensor measuring the parameter of interest to
4 determine transmissibility of power from the vibratory source to the anchor.

- 1 7. The apparatus of claim 6, wherein the parameter of interest is one of (i) motion of the
2 anchor; (ii) load on the anchor; (iii) load on a tubular string coupled between the anchor and the
3 vibratory source; and (iv) motion of the tubular string.
- 1 8. The apparatus of claim 5 further comprising a control unit to control the operation of the
2 vibratory source.
- 1 9. The apparatus of claim 8, wherein the control unit includes a computer.
10. The apparatus of claim 8, wherein the control unit controls frequency of operation of the
vibratory source in response to the sensed parameter of interest.
11. The apparatus of claim 10, wherein the control unit controls frequency in accordance
with programmed instructions provided to the control unit.
- 1 12. A system for obtaining seismic data, comprising:
2 — an anchor device engaged with the borehole at a selected location; and
3 — a vibratory source at a surface location coupled to the anchor causing the anchor to
4 induce seismic energy into the formation.
5 — at least one detector placed spaced-apart from the anchor, to detect seismic signals
6 responsive to the seismic energy imparted in the formation by the anchor.
- 1 13. The system of claim 12 further comprising a control unit to control the vibratory source.

2024-09-23 10:42:29

1 14. The system of claim 13, wherein the control unit controls the vibratory source in response
2 to the signals detected by the at least one detector.

1 15. The system of claim 12, wherein the at least one detector is placed at a location selected
2 from one of (i) surface location; (ii) a location in the borehole; (iii) a secondary borehole formed
3 spaced-apart from the borehole; or (iv) a secondary borehole that forms a part of a multibore
4 system containing the borehole.

1 16. The system of claim 12, wherein the at least one detector includes a plurality of spaced-
2 apart detectors.

1 17. The system of claim 12, wherein said control unit processes the signals detected by at
2 least one detector.

1 18. A method for inducing seismic energy in a formation penetrated by a borehole,
2 comprising:

- 3 - coupling a tubular string between a downhole anchor and a surface vibratory
4 source;
- 5 - vibrating the tubular string to generate a seismic wave in the formation at the
6 anchor.

1 19. The method of claim 18 further comprising for providing at least one sensor measuring a
2 parameter of interest, wherein the parameter of interest is one of (i) load on the anchor; (ii) load

7 – sensing the seismic energy by at least one detector spaced-apart from the anchor.

1 24. The method of claim 23, further comprising controlling the vibratory source with a
2 control unit.

1 25. The method of claim 23, further comprising controlling the vibratory source with a
2 control unit in response to the signals sensed by the at least one detector.

26. The method of claim 23, wherein the at least one detector is placed at a location selected
from one of (i) surface location; (ii) a location in the borehole; (iii) a secondary borehole formed
spaced-apart from the borehole; or (iv) a secondary borehole that forms a part of a multibore
system containing the borehole.